

# APPLICATION FOR LETTERS PATENT OF THE UNITED STATES

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## SPECIFICATION

To all whom it may concern:

Be It Known, That I, JOHN C. GOODWIN III, of Suwanee, GA, have invented certain new and useful improvements in ITEM PROCESSING DEVICE WITH BARCODE READER AND INTEGRATED RFID INTERROGATOR, of which I declare the following to be a full, clear and exact description:

**ITEM PROCESSING DEVICE WITH BARCODE  
READER AND INTEGRATED RFID INTERROGATOR**

**Background of the Invention**

The present invention relates to checkout systems in supermarkets and other retail establishments, and more specifically to an item processing device including a barcode reader and integrated RFID interrogator.

Checkout systems typically include barcode readers. Today, nearly all products are labelled with barcodes, either by the manufacturers or the retailers of such products.

Barcode readers come in various types for various purposes. The most common scanners are optical barcode readers which include lasers and mirrors for generating a scan pattern. Some are mounted in checkout counters, while others are portable and hand-held. An example barcode reader is disclosed in U.S. Patent No. 5,229,588 assigned to the assignee of the present invention. This patent is hereby incorporated by reference.

Some items would not be identifiable and recordable by a barcode reader, if they were labelled with Radio Frequency Identification (RFID) labels rather than barcode labels. RFID technology provides an alternative to bar code reader technology for distinguishing and recording items for purchase. Some of the uses of RFID technology are disclosed in U.S. Patent No. 6,019,394 assigned to the assignee of the present invention. This patent is hereby incorporated by reference.

It would be desirable to combine an RFID interrogator with a bar code reader into a single item processing

peripheral in order to maintain operator focus for item entry on a single area of a checkout counter, the area where the bar code reader is located.

### **Summary of the Invention**

In accordance with the present invention, an item processing device including a barcode reader and integrated RFID interrogator is provided.

The item processing device includes a barcode reader and a radio frequency product label interrogator coupled to the barcode reader.

It is accordingly an object of the present invention to provide an item processing device including a barcode reader and integrated RFID interrogator.

It is another object of the present invention to provide a single peripheral for processing merchandise items with barcode labels or RFID labels, rather than two.

It is another object of the present invention to combine maintain operator focus for item entry on a single area of a checkout counter, the area where the bar code reader is located.

### **Brief Description of the Drawings**

Additional benefits and advantages of the present invention will become apparent to those skilled in the art to which this invention relates from the subsequent description of the preferred embodiments and the appended claims, taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a block diagram of a transaction system with RFID capability;

Fig. 2 is a block diagram of a barcode reader of the present invention; and

Fig. 3 is a flow diagram illustrating the operation of the checkout apparatus.

### **Detailed Description**

Referring to Fig. 1, transaction system 10 primarily includes checkout counter 12 and transaction server 16.

Checkout counter 12 includes terminal 18, input device 20, display 22, printer 24, card reader 26, and label reader 30.

Terminal 18 controls operation of checkout counter 12 and executes transaction software 46.

Input device 20 records customer selections. Input device 20 may be a touch screen or keyboard.

Display 22 displays program instructions to assist the customer through a transaction. Display 22 may be a liquid crystal display and may be combined with input device 20 as a touch screen.

Printer 24 prints transaction information on receipt paper.

Card reader 26 reads information from customer payment and identification cards. Card reader 26 may include a magnetic stripe reader or smart card reader or combination of both.

Item checkout apparatus 30 reads RFID label 14 and barcode label 28. Item checkout apparatus 30 includes RFID label reader 32, scale 34, and barcode reader 46.

RFID label reader 32 reads identification information stored in RFID label 14.

Barcode reader 46 reads barcode label 28.

Scale 34 provides weight information for produce items and other random weight or bulk items.

RFID label 14 is an identification label. RFID label 14 may vary in size, depending upon product size, and may be visible or hidden when attached to a product. RFID label 14 may be removably or permanently attached to the product.

In one embodiment, RFID label 14 includes label communicator 38, RFID memory, and battery 42.

Label communicator 38 sends item identification information stored in RFID memory 40 to label reader 32. Label communicator 38 may include an RF transceiver.

Memory 40 stores item identification information and may include a read-only memory (ROM) for one-time use, or a programmable ROM (EPROM) for repeated use.

Battery 42 provides power to label communicator 38.

In another embodiment, RFID label 14 may be a passive label. Passive RFID labels use very little energy and may only include label communicator 38. Power may be derived from radio waves.

Label communicator 38 may include a reflective antenna which has a frequency which is unique among RFID labels 14. Label communicator 38 communicates RFID label identification information which must be cross-referenced to obtain item identification information from a table. Label communicator 38 may include a number of antennas, such as conductive ink antennas.

Transaction server 16 receives item identification information from terminal 18 and returns price information from price look-up data file 44. Terminal 18 obtains item identification information from item checkout apparatus 30.

Turning now to Fig. 2, item checkout apparatus 30 is illustrated in detail.

RFID label reader 32 is preferably located inside housing 48 of barcode reader 46, but may also be affixed to the outside of the housing 48 as well. RFID label reader 32 includes label interrogator 64, antenna 66, and control circuitry 68.

Label interrogator 64 interrogates RFID label 14 to obtain identification information. Label interrogator 64 may include an RF transceiver. label interrogator 64 uses antenna 66.

Control circuitry 68 controls operation of RFID label reader 32 and provides identification information to terminal 18 through barcode reader 46. Control circuitry 68 may include commonly available circuitry for sensing the presence of an item. Control circuitry 60 may also wakeup certain components, such as laser 50, for operation.

Control circuitry 68 feeds identification information to control circuitry 60 through serial port 62, but may also feed identification information directly to terminal 18 without going through serial port 62 or control circuitry 60.

An example barcode reader 46 primarily includes laser 50, optical transceiver 52, polygon spinner 54, pattern mirrors 56, photodetector 58, and control circuitry 60. However, other types of barcode readers, including portable or hand-held barcode readers, are envisioned as well.

Laser 50 provides a laser beam. The laser beam passes through optical transceiver 52, which includes a mirrored collecting surface and an aperture for passing the laser beam.

Polygon spinner 54 includes mirrored facets which directing the laser beam at pattern mirrors 56. Pattern

mirrors 56 direct the laser beam to produce a plurality of scan lines.

Light reflected from barcode label 28 is directed by pattern mirrors 56 to polygon spinner 54, which directs the light to optical transceiver 52. The collecting surface of optical transceiver 52 directs the light to photodetector 58, which generates electrical signals representing the intensity of the reflected light.

Control circuitry 60 interprets the electrical signals to determine item identification information.

Control circuitry 60 optionally obtains item identification information or RFID label identification information from RFID label reader 32 through serial port 62. If configured this way, control circuitry 60 passes identification information from both barcode label 28 and RFID label 14 to terminal 18.

Referring now to Fig. 3, the operation of item checkout apparatus 30 is illustrated in detail beginning with START 90.

In step 92, item checkout apparatus 30 waits for an item present signal to read a label.

Control circuitry 60 within barcode reader 46 may generate the signal, if it is equipped with item sensing circuitry. In the configuration of Fig. 2, control circuitry 60 may alert control circuitry 68 through serial port 62. Regardless of configuration, transaction software 46 may provide the signal to both control circuitry 60 and 68 in response to operator input from input device 20.

In step 94, control circuitry 60 activates any inactive components in barcode reader 46 and scans the item for barcode label 28, and control circuitry 68 activates label interrogator 64 to seek RFID label 14.

In step 96, control circuitry 60 examines reflected light from the item for barcode information, and if control circuitry 60 senses barcode information, control circuitry 60 decodes the barcode information to obtain item identification information. Control circuitry 68 determines whether RFID label information has been received.

In step 98, one or both of control circuitry 60 and 68 send identification information to terminal 18. The identification information from both control circuitry 60 and 68 may be item identification information. Alternatively, control circuitry 68 may send RFID label identification information from which item identification information can be derived from a look-up table.

Transaction software 36 may compare item identification information derived from control circuitry 60 and 68 when both send it. Transaction software 36 sends a price request including the item identification information to transaction server 16. Operation returns to step 92 to await another signal.

Although the present invention has been described with particular reference to certain preferred embodiments thereof, variations and modifications of the present invention can be effected within the spirit and scope of the following claims.